

REMARKS

Present Status of Application

The Office Action mailed January 17, 2003 rejected all presently pending claims 1-15. Specifically, claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaha (U.S. Pat. 6,297, 563), and claims 8-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaha in view of Lu et al. (U.S. Pat. 6,100,573).

Summary of Applicant's Invention

The Applicant's invention is directed to a bonding pad structure. The bonding pad structure comprises a bonding pad, and a current conduction structure and a mechanical support structure under the bonding pad. The current conduction structure and the mechanical support structure are located over a device section and a non-device section, respectively, and each structure comprises a plurality of metallic layers and plugs, wherein the upmost metallic layer is electrically connected to the bonding pad.

An example of the bonding pad structure of this invention is shown in Fig. 1, wherein a substrate 100, a bonding pad 116, a current conduction structure 114, a mechanical support structure 112, a device section 118 and a non-device section 120, etc., are illustrated.

Discussion of Rejections under 35 U.S.C. 103

Claims 1-7 were rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaha (U.S. Pat. 6,297, 563). Claims 8-15 were rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaha in view of Lu et al. (U.S. Pat. 6,100,573).

The Office Action considered that Yamaha substantially disclosed the structure of

the present invention, and asserted that area structure A and B were comparable to the current conduction structure and the mechanical support structure of the present invention.

Applicant respectfully traverses this interpretation for at least the following reasons.

As mentioned above, one feature of the bonding pad structure of this invention is the current conduction structure over the device section and between (under) the bonding pad layer and the substrate for electrically connecting the bonding pad layer and the substrate, as recited in independent claims 1 and 8 with bold marks.

1. (Thrice Amended) A bonding pad structure, comprising:
a substrate having at least a device section and a non-device section;
a bonding pad layer above the substrate;
a current conduction structure over the device section, between the bonding pad layer and the substrate for connecting the bonding pad layer and the substrate electrically, wherein the current conduction structure includes:
a plurality of conductive metallic layers, wherein each conductive metallic layer is at a different height level from the substrate; and
a plurality of conductive plugs for linking neighboring conductive metallic layers and the conductive metallic layers with the bonding pad layer and the substrate;
a mechanical support structure connecting with the non-device section of the substrate, between the bonding pad layer and the substrate, wherein the mechanical support structure includes:
a plurality of support metallic layers, wherein each support metallic layer is at a different height level from the substrate; and
a plurality of support plugs for linking up neighboring support metallic layers and the support metallic layers with the bonding pad layer and the substrate; and
an insulation layer between the bonding pad layer, the current conduction structure, the mechanical support structure and the substrate for isolating the current conduction structure from the mechanical support structure.

8. (Thrice amended) A bonding pad structure, comprising:
a substrate having at least a device section and a non-device section;
a bonding pad layer above the substrate;
a current conduction structure over the device section, between the bonding pad layer and the substrate for connecting the bonding pad layer and the substrate electrically, wherein the current conduction structure includes:
a plurality of conductive metallic layer, wherein each conductive metallic layer is at a different height level from the substrate and **one of the conductive metallic layers is in direct contact with the substrate**; and
a plurality of conductive plugs for linking neighboring conductive metallic layers and linking one of the conductive metallic layers with the bonding pad layer;

a mechanical support structure connecting with the non-device section of the substrate, between the bonding pad layer and the substrate, wherein the mechanical support structure includes:

*a plurality of support metallic layers, wherein each support metallic layer is at a different height level from the substrate and **one of the support metallic layers is in direct contact with the substrate;** and*

a plurality of support plugs for linking neighboring support metallic layers and linking one of the support metallic layers with the bonding pad layer; and

an insulation layer between the bonding pad layer, the current conduction structure, the mechanical support structure and the substrate for isolating the current conduction structure from the mechanical support structure.

Applicant respectfully asserts that the structure claimed in the present invention patentably distinguishes over Yamaha's or Lu's structure, because the references at least lack these features emphasized above (in bold).

Applicant respectfully points out that Yamaha's insulation film 12 (made of silicon dioxide or the like) covering on the substrate 10 electrically isolate the substrate 10 from the first-level wiring layer 14a and the first-level pad layer 14b (as shown in Fig. 1 and Col. 5, lines 59-62). Therefore, the stacked structure (including wiring layers and contact plugs 14a, 18a, 20a, 24a, 26a, 30a and 32a) in area A is electrically insulated from the substrate 10 due to the oxide insulation film 12. Obviously, Yamaha fails to teach or suggest a current conduction structure over the device section, between the bonding pad layer and the substrate for electrically connecting the bonding pad layer and the substrate.

Furthermore, Yamaha does not disclose the device section and the non-device section in the substrate. Therefore, it is impossible that Yamaha disclose the mechanical support structure connecting with the non-device section of the substrate.

As disclosed in Yamaha's statement (Col. 10, lines 37-65), wiring layers 14a, 20a, 26a are connected to the pad layers 14b, 20b, 26b by wiring patterns 14c, 20c, 26c (Fig. 3). On the contrary, the current conduction structure and the mechanical support structure of the present invention are detached structures. Therefore, it is not reasonable for the Office

Action to consider the area structures A and B comparable to the current conduction structure and the mechanical support structure of the present invention.

For at least the reasons mentioned above, Applicant respectfully submits that independent claim 1 patently defines over Yamaha.

For the same reasons mentioned above, Yamaha also fails to teach or suggest the details as described in claims 2-4 and 6-7 of this invention. Thus, Applicant respectfully submits that dependent claims 2-7 also patently define over Yamaha.

As noted in the Office Action, Yamaha fails to disclose that one of the conductive metallic layers and one of the support metallic layers are in direct contact with the substrate. Moreover, as discussed above, Yamaha does not teach or suggest the current conduction structure over the device section, between the bonding pad layer and the substrate for electrically connecting the bonding pad layer and the substrate and the mechanical support structure connecting with the non-device section of the substrate, as claimed in the present invention. Lu fails to remedy the deficiencies of Yamaha's.

Thus, even if combined, the combination of the cited references does not render the claim 8 of the present invention obvious. For at least the same reasons, dependent claims 9-15 are submitted to patently define over the cited references.

Reconsideration and withdrawal of these rejections under 35 USC 103(a) are respectfully requested.

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CONCLUSION

In view of the foregoing, it is believed that all pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

Dated: April 7, 2003

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